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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/118,833
Filing Date: July 20, 1998
Appellant(s): NISHI ET AL.

Robert E. Goozner
For Appellant

MAILED
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GROUP 1700

SUPPLEMENTAL EXAMINER'S ANSWER

Pursuant to the Remand under 37 CFR 1.193(b)(1) by the Board of Patent Appeals and Interferences on August 4, 2005, a supplemental Examiner's Answer is set forth below.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is substantially correct. The changes are as follows: the second issue is moot, as the §103 rejection over Soma et al. has been withdrawn. The first and third issues are outstanding. Regarding the first issue (§102 rejection over Soma et al.), only the rejection of claims 10, 11, and 27 has been maintained.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 4-30 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,411,767	SOMA ET AL	2-1995
JP 08-050913	JAPAN	2-1996

(10) Grounds of Rejection

The 35 USC §112, first paragraph rejection of claim 29 has been withdrawn.

The 35 USC §102 and §103 rejections of claims 4, 6, 8, 12-17, 21-26, and 28-30 over Soma et al. have been withdrawn. These rejections were withdrawn because it is believed that the structure of the Soma interconnector and the structure of the claimed interconnector are different. In Soma, the interconnector is made by a thermal spraying process. As set forth in column 6, line 32 et seq., the grains are *melted* during the spraying process. In contrast, the claimed interconnector is *sintered*. Sintering is generally defined as heating without melting. For example, Hawley's Condensed Chemical Dictionary, 14th ed., defines "sintering" as "the agglomeration of metal or earthy powders at temperatures below the melting point." As such, it is believed that the interconnector of Soma cannot be considered to be "sintered" since the grains have been melted and thereby would possess a different microstructure than grains that have not been melted.

However, it is noted that the rejection of claims 10, 11, and 27 has been reinstated in this Supplemental Examiner's Answer. These claims recite an "integrally burned" interconnector, rather than a "sintered" one. This rejection finds support in the Final Rejection mailed January 15, 2004 and is not a new ground of rejection.

The following ground(s) of rejection are applicable to the appealed claims:

Claims 10, 11, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Soma et al (U.S. Patent 5,411,767). Soma et al. teach a solid electrolyte type fuel battery having an interconnector comprising a material having the formula ABO_3, wherein A is preferably Ca, Ba, or Sr, and B is preferably Ti (see column 5, lines 13-38). Soma et al. further teach a fuel electrode (1), an air electrode (3), an electrolyte (2), and a substrate (4) in Figure 1 and in column 6, line 50, et seq. As disclosed in column 2, lines 47-58, the interconnector is formed by plasma spraying followed by a heat treatment, which closes pores and microstructurally homogenizes the film. Thus the interconnector is "burned" by the heat-treatment. Further, the reference teaches in column 2, lines 29-37 that the interconnector film is thermally sprayed onto a fuel or air electrode "raw" material, and then the interconnector film is heat-treated. The raw (i.e., green) fuel or air electrode films would inherently be burned along with the interconnector film, thus resulting in an "integrally burned" interconnector. Regarding claim 27, the relative density

of the interconnector is 95% or greater (see col. 9, line 61). Thus, claims 10, 11, and 27 are anticipated.

Claims 4-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-50913 in view of Soma et al (U.S. Pat. 5,411,767).

Regarding claims 4, 6, 8, 10, 12, 14, 16, 28, and 30, in the abstract, JP 8-50913 teaches a method of making a solid oxide fuel cell comprising the step of integrally sintering (burning) an air electrode (23) and an interconnector (24), which together comprise a support tube (22). Regarding claims 11, 13, 15, and 17, the fuel cell further comprises a fuel electrode (26) and an electrolyte (25). Regarding claims 5, 7, 9, and 18-20, as shown in Figures 1 and 2, the interconnector is located at the top of the tube, thus providing for current collection from the fuel electrode through an adjacent interconnector in the "vertical" direction.

The Japanese reference does not expressly teach the material(s) which may comprise the interconnector (claims 4, 6, 8, 10, 12, 14, 16, 28, and 30), the temperature at which the sintering is performed (claims 21-23 and 29), or the relative density of the interconnectors (claims 24-27).

Soma et al. teach a solid electrolyte type fuel battery having an interconnector comprising a material having the formula ABO_3, wherein A is preferably Ca, Ba, or Sr, and B is preferably Ti (see column 5, lines 13-38). In column 3, line 23, Soma et al. describe this material as being "suitable for [an] interconnector." In Table 1, Soma et al. disclose that the interconnectors are heat treated at a temperature of 1400°C. The relative density of the interconnector is 95% or greater (see col. 9, line 61).

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the courts have held that the selection of a known material based on its suitability for its intended use is *prima facie* obvious (MPEP §2144.07). Accordingly, the artisan would be motivated to use the species disclosed by Soma in the interconnector of the Japanese reference. Furthermore, the artisan would be motivated to use a sintering temperature of 1400°C in the manufacturing process of JP '913. In column 6, lines 44-49, Soma et al. teach that a heat treatment temperature of at least 1250°C for these materials is "preferabl[e]." Therefore, the artisan would be motivated to perform the sintering step of JP '913 at a temperature of 1400°C.

Regarding claims 6, 8, 14, and 16, in column 4, line 40 et seq., Soma et al. teach an interconnector material formula of $(La_{1-x}D_x)_{1-u}B_{1-w}O_3$, where D can be Ca, Sr, or Ba, B can be Ti (+Mg, +Nb), x is less than or equal to 0.3, u is greater than or equal to 0, and w is less than or equal to 0.1.

Soma does not expressly teach the same or overlapping subscript ranges for the $(La_{1-x}D_x)_{1-u}B_{1-w}O_3$ compounds as recited in claims 6, 8, 14, and 16. For example, claims 6 and 14 provide for a $Sr_{0.8}La_{0.2}TiO_3$ material, whereas the reference provides for a $Sr_{0.09}La_{0.2}TiO_3$ material (when w=0, x=0.3, u=0.71, D is Sr, and B is Ti). Also, claims 8 and 16 provide for a $Mg_{0.8}La_{0.2}TiO_3$ material, whereas the reference provides for a $Mg_{0.8}La_{0.2}Ti_{0.2}O_3$ material (when x=0, u=0.8, w=0, and B is $Ti_{0.2}Mg_{0.8}$).

However, the claimed materials and prior art materials have substantially identical elemental compositions, and therefore could reasonably be expected to have similar properties.

As such, the artisan may manipulate these subscript ranges so as to vary the necessary amounts of reagents, and thus optimize the production costs of the materials. If a prior art range and a claimed range do not overlap, obviousness may still exist if the ranges are close enough that one would not expect a difference in properties. *In re Woodruff* 16 USPQ2d 1934 (Fed. Cir. 1990); *Titanium Metals Corp. v. Banner* 227 USPQ 7723 (Fed Cir. 1985); *In re Aller* 105 USPQ 2233 (CCPA 1955). See also MPEP §2144.09.

Finally, the recitation in instant claims 13, 15, and 17 that the electrodes, electrolyte, and interconnector are "laminated onto a substrate" is not considered to distinguish over the Japanese reference. As noted above, the reference identifies the combination of the air electrode and interconnector as a "support tube" (22), which itself functions as a substrate. Accordingly, it is seen that the "substrate" defined by the instant claims is integrally present in the fuel cell structure of the reference. Furthermore, it is noted that Soma et al. contemplate the interchangeability of a "true" substrate (4) and an "air electrode" substrate (13) in Figures 1 and 2 and in column 7, lines 3-10. Thus, these configurations are seen as functionally equivalent.

(11) Response to Argument

As set forth above, the rejection of claims 4, 6, 8, 12-17, 21-26, and 28-30 over Soma et al. has been withdrawn and the rejection of claims 10, 11, and 27 over Soma has been maintained. The difference in these claim sets is that the former recites a "sintered" interconnector, and the latter recites a "burned" interconnector. It is submitted that since no

special definition of "burned" has been set forth in the instant specification, the heat-treatment step of Soma results in the claimed "burned" interconnector.

Regarding the declarations filed under 37 CFR 1.132 filed by Appellants, the Examiner maintains the position that Appellants have not made comparisons that are germane to the claimed invention. The declarations do not show that a heating step was performed on the plasma sprayed material, which would be necessary to replicate the material of Soma et al. Furthermore, the comparative material, lanthanum chromite, is not germane to the claimed invention.

Regarding the rejection of claims 4-30 over JP 8-050913 (certified translation attached) and Soma et al., Appellants assert that Soma is non-analogous art to the present invention because "the field of endeavor of Soma is thermal spraying, which is in marked contrast to the sintering of the present invention" (Appeal Brief, page 16). However, it is submitted that Soma is concerned with interconnectors for solid oxide fuel cells, which is the same field of endeavor as the present invention. Accordingly, appellant's argument that Soma is non-analogous art is not persuasive.

Further regarding the rejection over JP 8-050913 and Soma et al., the 1.132 declarations are not believed to be relevant to this rejection. The declarations each show a plasma spraying process; however, JP '913 is not concerned with a plasma spraying step. As set forth above, JP '913 teaches the claimed sintering/co-sintering method steps, and Soma is merely relied upon as teaching the specific materials suitable for use in this method. As such, it is still believed that appellants' claimed products and methods would be rendered obvious by JP '913 in view of Soma.

Appellants further assert that the $A_{1-x}B_xC_{1-y}D_yO_3$ formula of claims 6 and 8 has criticality when x is 0.2 (brief, page 25). Figure 30 of the application is cited as supporting this position. However, it is believed that this graph is not sufficient to establish criticality of the subscript x=0.2. It is noted that the relative density decreases by less than 2% for both materials when x is increased from 0.2 to 0.3. Furthermore, the relative densities when x=0.3 are still greater than 94%. As evidenced by the inclusion of this range into the claims, 94% is considered to be a good relative density. Therefore, it is believed that appellants have not shown criticality of the x=0.2 (i.e., $Sr_{0.8}La_{0.2}$) limitation. It is noted that Soma teaches an $Sr_{0.09}La_{0.2}$ composition in col. 4, line 44 (when x=0.3 and u=0.71). It is submitted that a comparison of the claimed composition(s) with the composition(s) of Soma would be useful in distinguishing the claimed composition(s).

On pages 23 and 24 of the brief, appellants state that the vertical collection of current would not be an obvious design choice. However, appellants' statement is moot because this ground of rejection was withdrawn in the Office action of July 24, 2003. Regarding the JP '913 reference, appellants state that "the interconnector 24 shown in Figures 1 and 2 of JP '913 may be depicted in a fashion best suited to display the fuel cell, and the true orientation and current collection of the interconnector 24 is problematic." However, it is submitted that JP '913 is anticipatory of this limitation because the electron-conducting interconnector (24) is located at the top of the fuel cell (see Fig. 2), and there is no indication in the reference that the fuel cell should be rotated or its orientation otherwise changed. Thus, in normal operation of the fuel cell of Fig. 2, current collection would be in the vertical direction, since the interconnector would be connected to an external terminal or another fuel cell.

Regarding the temperature of the sintering (as recited, for example, in claim 21), the Examiner maintains that the Soma reference gives sufficient guidance to use a temperature of 1400°C to integrally sinter the fuel cell of JP '913. First, it is known that calcium titanate (one of the species of claim 4) melts at about 1800°C. As sintering is generally defined as heating without melting, it would be obvious to perform the sintering at a temperature somewhat below the melting point. Furthermore, as suggested at column 6, line 44 of Soma, the relative density of the resulting interconnector can be controlled by controlling the heat treatment temperature. It has been held that the discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).

It is believed that each of appellants' arguments relating to the outstanding rejection has been substantively addressed herein. For the above reasons, it is believed that the rejection should be sustained.

Respectfully submitted,

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August 28, 2005

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